DETAILED ACTION

1. The response filed on 4/14/08 has been received and considered. Claims 1-92 have been presented for examination. Claims 1-49, 67 and 68 have been withdrawn. Claims 50-66 have been cancelled.

Election/Restrictions

2. Applicant's election of group 6 in the reply filed on 4/14/08 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Drawings

3. The drawings are objected to because Figure 6, element "616", "Validation" appears to be labeled "618". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary

to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The abstract of the disclosure is objected to because line 6 recites "and] or" which appears to be a typographical error and should be written "and/or". Correction is required. See MPEP § 608.01(b).

Claim Objections

5. Claims 71, 75, 79, 86-88 and 91are objected to because of the following informalities. Appropriate correction is required.

6. Claims 71, 79 and 87 recite, "the time of extraction", it would be better if written, "a time of extraction".

7. Claim 75, line 4, claim 83, line 4 and claim 91, line 4 recite, "the first cone", it would be better if written, "a first cone".

8. Claims 86, 87 and 88 recite, "wherein the code for predetermined relationship", it would be better if written, "wherein the code for the predetermined relationship".

9. Claim 91, lines 1-2 recite, "the code for plurality of clusters", it would be better if written, "the code for defining a plurality of clusters".

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 73, 74, 81, 82, 85-92 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Claims 73, 74, 81, 82, 89 and 90 recite the limitation "the further predetermined relationship". There is insufficient antecedent basis for this limitation in the claim.

13. Claims 85-92 are directed to “a computer program for determining extraction of material from a mine”, wherein the computer program comprises "code". This claim fails to set forth that the “code” is embodied on some computer readable medium and further, that the code is actually executed by a processor thereby enabling the “determining” of the extraction of material from a mine. Therefore, the claims appear to be directed to “code” segments that do not actually perform any method or calculations.

Claim Rejections - 35 USC § 101

14. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

15. Claims 85-92 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are directed to "a computer program" comprising code. This subject matter is directed to a computer program without a computer-readable medium needed to realize the computer program's functionality and therefore, is directed to nonstatutory functional descriptive material. See further, MPEP 2106.01 which recites, *"Data structures not claimed as embodied in computer-readable media are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer. See, e.g., Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory."*

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. Claims 69, 70, 72-74, 77, 78, 80-82, 85, 86, 88-90 are rejected under 35 U.S.C. 102(b) as being anticipated by Hochbaum et al ("Performance Analysis and Best Implementations of Old and New Algorithms for the Open-Pit Mining Problem", Department of Industrial Engineering and Operations Research, University of California, Berkley, January 16, 1998).

18. As to Claims 69, 77 and 85, Hochbaum et al teaches: a method, apparatus and computer program for determining extraction of material from a mine having at least one pit (section 1, paragraph 4, "open pit mining problem" and description) comprising: forming a block model of the pit in which material is divided into a plurality of blocks (section 1, paragraph 1, lines 6-8, "...the entire volume is subdivided into blocks..."; section 1, paragraph 6, "economic block model"); defining a plurality of clusters each comprising a plurality of blocks having a predetermined relationship (section 1, paragraph 4, lines 6-8, "…to decide which blocks to extract…is equivalent to finding a maximum weight set of nodes in the graph such that all successors of the nodes in the set are included in the set. Such a set is called a maximum closure of G"; section 2.4, paragraph 2, lines 5-8, "...there is a partition of the set of nodes to a collection of subsets...The incumbent candidate for maximum closure is the union of the strong

subsets..."; section 4.1, "Generation of Ore Clusters"); determining a plurality of cones by precedent arcs extending from each cluster (section 1, paragraph 1, lines 9-11, "…constraints that specify the slope requirements of the pit and precedence constraints…"; section 1, paragraph 4, lines 5-6, "directed arc"; section 1, paragraph 6, "precedence constraints", "precedence pattern"; section 3.2, paragraphs 2 and 3, "cones"); and defining clumps of material by the intersection of the cones so that material is extractable from the mine in a desired clump order to provide flexibility in the extraction of the material from the mine (section 1, paragraph 1, lines 8-12, "…Subject to these constraints, the objective is to mine the set of blocks which provide the maximum net benefits"; section 3.2, description of methods that use cones to determine clumps of material to be extracted from the mine that will maximize profit). Hochbaum teaches that the different algorithms described were run on a computer to determine their performance, therefore, it is understood that a processor is present to implement the algorithms taught (section 4, paragraph 1, lines 1-2; section 10, paragraph 4, lines 1-2).

19. As to Claims 70, 78 and 86, Hochbaum et al teaches: wherein the predetermined relationship used to define each cluster comprises spatial position of blocks relative to one another (section 1, paragraph 1, lines 9-11; section 1, paragraph 4, lines 5-8; section 3.2, paragraph 2).

20. As to Claims 72, 80 and 88, Hochbaum et al teaches: wherein the predetermined relationship further comprises a variable selected from the group comprising value of material, grade of material, and material type (section 1, paragraph 1, lines 8-9, "Each

block has a weight associated with it representing the value of its ore…"; section 1, paragraph 4, lines 2-5).

21. As to Claims 73, 81 and 89, Hochbaum et al teaches: wherein the emphasis of the further predetermined relationship is increased so that clusters are formed from blocks which are more spatially fragmented but more closely follow an optimal extraction schedule (section 1, paragraph 1, lines 5-12, "…the objective of the mine is to mine the set of blocks which provide the maximum net benefits"; section 3.4, description of scheduling algorithms, specifically, paragraph 6, "maximize the net present value (NPV)…".paragraph 8, algorithm by Vallet, paragraph 9, algorithm by Dagdelen et al, paragraph 10, "…mining the most valuable ore rock as early as possible would maximize the net present value…"; section 3.5, description of the Johnson algorithm).

22. As to Claims 74, 82 and 90, Hochbaum et al teaches: wherein the emphasis of the further predetermined relationship is decreased so the clusters are formed from blocks which are spatially compact but ignore an optimal extraction sequence (section 1, paragraph 1, lines 5-12, "…the objective of the mine is to mine the set of blocks which provide the maximum net benefits"; section 3.4, description of scheduling algorithms, specifically, paragraph 6, "maximize the net present value (NPV)…".paragraph 8, algorithm by Vallet, paragraph 9, algorithm by Dagdelen et al, paragraph 10, "…mining the most valuable ore rock as early as possible would maximize the net present value…"; section 3.5, description of the Johnson algorithm).

Claim Rejections - 35 USC § 103

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

24. Claims 71, 75, 79, 83, 87 and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hochbaum et al as applied to claims 69, 70, 77, 78, 85 and 86 above, and further in view of Gershon ("Heuristic Approaches for Mine Planning and Production Scheduling", International Journal of Mining and Geological Engineering", 1987, 5, pages 1-13).

25. Hochbaum et al teaches a method of determining extraction of material from a mine comprising defining a plurality of clusters each comprising a plurality of blocks having a predetermined relationship.

26. Hochbaum et al does not expressly teach (claims 71, 79, 87) wherein the predetermined relationship further comprises the time of extraction; (claims 75, 83, 91) wherein when the plurality of clusters has been defined, the clusters are ordered in time and the plurality of cones are propagated upwardly from each cluster in order of time, and wherein any blocks already assigned to the first cone are not included in a second cone or any subsequent cone, and any blocks assigned to the second cone are not included in any subsequent cone and so-on.

27. Gershon teaches two new approaches aimed at improving the mine production scheduling process that add an ability to look ahead and analyze how important it is to mine in any area at the current time (Conclusion, paragraph 1, lines 1-6) the method of which include (claims 71, 79, 87) wherein a predetermined relationship between blocks further comprises a time of extraction (page 10, paragraph 2, lines 9-12, "...this mine plan will also yield information concerning approximately how long it will take to reach a given area of the mine" and line 15, item (2) "position of the block"); (claims 75, 83, 91) wherein when the plurality of clusters has been defined, the clusters are ordered in time (page 8, paragraph 3, lines 3-7, “Once these positional weights are determined for each exposed block, They are ranked. The block having the highest positional weight should be mined first”) and the plurality of cones are propagated upwardly from each cluster in order of time, and wherein any blocks already assigned to the first cone are not included

in a second cone or any subsequent cone, and any blocks assigned to the second cone are not included in any subsequent cone and so-on (page 8, paragraph 3, "This index of desirability..." and Figure 2 and description; page 7, paragraph 4 and Figure 1, discussion of generation of upward and downward cones; page 8, paragraph 3, discussion of ranking blocks).

28. Hochbaum et al and Gershon are analogous art since they are both directed to determining an optimum pit extraction sequence.

29. It would have been obvious to one of ordinary skill in the art at the time the invention was make to modify the a method of determining extraction of material from a mine as taught by Hochbaum et al to further include a predetermined relationship such as time, ordering the clusters in time and the plurality of cones are propagated upwardly from each cluster in order of time, and wherein any blocks already assigned to the first cone are not included in a second cone or any subsequent cone, and any blocks assigned to the second cone are not included in any subsequent cone and so-on as taught by Gershon since Gershon teaches two new approaches aimed at improving the mine production scheduling process that add an ability to look ahead and analyze how important it is to mine in any area at the current time (Conclusion, paragraph 1, lines 1-6) the method of which include (claims 71, 79, 87).

30. Claims 76, 84 and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hochbaum et al as applied to claims 69, 71 and 85 above, in view of Jain et al

("Data Clustering: A Review", ACM Computing Surveys, vol. 31, No. 3, September, 1999).

31. Hochbaum et al teaches defining a plurality of clusters each comprising a plurality of blocks having a predetermined relationship.

32. Hochbaum et al does not expressly teach: wherein the size of each cluster is controlled to a predetermined size by reducing oversized clusters by reassigning blocks of that cluster according to their probability of belonging to other clusters.

33. Jain et al teaches that cluster analysis is the organization of a collection of patterns (usually represented as a vector or measurements or a point in a multidimensional space) into clusters based on similarity that is useful in several exploratory pattern analysis, grouping, decision-making and machine learning situations and teaches an overview of different clustering techniques including the fuzzy clustering method (Abstract, lines 7-10; section 1.1, paragraph 1, lines 15-19 and paragraph 3, lines 1-6) wherein the size of each cluster is controlled to a predetermined size by reducing oversized clusters by reassigning blocks of that cluster according to their probability of belonging to other clusters (section 5, point 3, "Hard vs. Fuzzy", lines 4-7; "degree of membership"; and section 5.5, specifically, "...Fuzzy clustering extends this notion to associate each pattern with every cluster using a membership function", "an element u_{ij} represents the grade of membership of object x_i in cluster c_j..."; "...Reassign patterns to clusters to reduce this criterion function value and recompute U").

34. Hochbaum et al and Jain et al are analogous art since they are both directed to forming clusters for data analysis.

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the defining a plurality of clusters as taught in Hochbaum et al to further include controlling the size of each cluster to a predetermined size by reducing oversized clusters by reassigning blocks of that cluster according to their probability of belonging to other clusters as taught by Jain et al since Jain et al teaches that cluster analysis is the organization of a collection of patterns (usually represented as a vector or measurements or a point in a multidimensional space) into clusters based on similarity that is useful in several exploratory pattern analysis, grouping, decision-making and machine learning situations and teaches an overview of different clustering techniques including the fuzzy clustering method (Abstract, lines 7-10; section 1.1, paragraph 1, lines 15-19 and paragraph 3, lines 1-6).

Conclusion

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary C. Jacob whose telephone number is 571-272-6249. The examiner can normally be reached on Tuesday-Thursday, 7AM-4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Mary C Jacob/

Examiner, Art Unit 2123

/M. C. J./

10/29/08

/Zoila E. Cabrera/

Primary Examiner, Art Unit 2123